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ABSTRACT

Purposes of the study were (1) to present some of the problems of the organizational structure of Chilean agriculture, and (2) to explore some of the factors related to diffusion and adoption of agricultural practices as aspects of social and technological change and development. Two central factors considered in the research problem were (1) analysis of the processes of communication and diffusion of new ideas and technologies, and (2) acceptance and actual adoption of recommended farm practices among Chilean farmers. The 3 dependent variables selected were exposure to mass media, exposure to technical agricultural communication, and adoption of recommended farm practices. Interviews were conducted with 244 farmers of 3 communities located in the province of Colchagua. It was found that levels of usage of public information channels, as measured by an index of exposure to mass media, were associated with social factors such as age, education, farm size, and income. Other findings suggested that the farmers' informal associates and commercial and institutional sources influenced adoption; that mass media appeared to be divorced from the adoption process; and that agricultural extension service and other agricultural agencies were relatively unimportant as diffusion and adoption agents. (AN)

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THE CHALLENGE FOR CHANGE IN RURAL CHILE

A STUDY ON DIFFUSION AND ADOPTION OF AGRICULTURAL INNOVATIONS

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The author wishes to express his appreciation to professors George A. Donohue, Charles E. Ramsey, Phillip J. Tichenor, and Roy E. Carter for their valuable advice and encouragement during the various stages of the study. Chilean government authorities at the Chilean Ministry of Agriculture and the National Institute of Agricultural Development (INDAP) also gave generous cooperation to field work activities in the rural areas of Chile.

The reader of this bulletin should keep in mind that much change has occurred in the Chilean rural scene over the last few years. Since the field research for this report was conducted in 1965, there have been serious attempts to bring about a social transformation of the Chilean rural sector through land reform programs, community development projects, organization of rural workers and modernization of agriculture. In addition, strong emphasis has been given to technical assistance to farmers in order to increase agricultural production of the country. Both national and international efforts have been devoted to this task. By means of research such as that reported here and action programs currently in operation in the country, the University of Minnesota has been channeling international cooperation for agricultural development into Chile.

The author of this study is a Chilean sociologist who received his Ph.D. degree at the University of Minnesota. Before he came to the United States Professor Menanteau graduated from the School of Journalism at the University of Chile and from the School of Sociology at the Catholic University in Santiago, Chile.

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INTRODUCTION

Latin America today is involved in a large-scale race between its rapidly increasing population and the improvement of its productivity in all economic areas. Perhaps the most striking dilemma is the increasing number of people to be fed and the agricultural production of each country.

Within that race between population and production, another no less important conflict is that established by the internal dynamics of the development process which undertakes the risk of producing an unbalanced output among the basic components of the national economy. Preferences toward industrialization may result in damage to the agricultural sector. Emphasis upon radical social reforms may produce shortcomings to both agriculture and industry. Thus, the problem being faced by most of the Latin American countries is how to achieve a quick but balanced process of development embracing social, political, and economic factors of their people.

Chile, one of the 20 Latin American participants in this significant race, was selected for this study which brings into focus some of the aspects related to agricultural development.

The geographical setting of the study corresponds to three rural communities located in the central valley of Chile. The subject matter emphasizes some of the structural dimensions of farmers of this area as they are connected to processes of diffusion and adoption of new agricultural practices.

BACKGROUND OF THE PROBLEM

Chile: A Case of Unbalanced Development

The trend of industrialization experienced by Chile during the last 30 years produced an imbalance in the total socio-economic growth of the country. While attention and effort has been placed upon industrialization of the country for more than three decades, both the rural sector and agricultural production have been largely neglected.[29]

An evaluation of economic development in Chile during the last three decades reveals that while agricultural production increased only 84 percent, the industrial sector grew 354 percent.[8]

The production indexes of three basic economic areas indicate that agricultural output has not kept pace with the rate of increase experienced by the mining and industrial sectors. While industry grew from an index of 112 in 1958 to an index of 147 in

1962, agricultural production indexes only grew from 122 to 124 during the same period.

These facts show that the total economic growth of Chile has been small, and that the structure of production and development has been unbalanced among the different sectors of the national economy, with agriculture being the most seriously damaged.

A chronic inflationary process also has contributed to Chile's economic difficulties. Throughout the 1950's the country had one of the highest rates of inflation in the world, exceeded only by Bolivia. In spite of several measures taken by the government to stop inflation, the cost of living rose on the average of about 19 percent annually between 1956 and 1962. Considering 1958 as a year base equal to 100, the cost of living rose 39 percent in 1959 and 16 percent in 1960. In 1961, it rose 12 percent and in 1962, 23 percent in relation to the previous year.

The rate of increase in the cost of living brought a rate of increase of wages. This indicates that the demand for foodstuffs by the wage earner increased while the per capita agricultural production remained static. Moreover, if 1958 is taken as a year base equal to 100, it is evident that agricultural production per capita decreased during recent years, becoming equal to 93 in 1962.

The Land

The total area of Chile is 74,177,000 hectares* (286,396 square miles). Its irregular geographic setting, topography, and shape — characterized by its average width of 109 miles and length of 2,650 miles — limit the use of the land for agricultural purposes.

According to the National Agricultural Census of 1955, about 37 percent of the total land area (nearly 27.5 million hectares) is classified as farmland. Only 5.5 million hectares

Table 1. Land distribution and land use in Chile

Land use	Hectares	Percent cultivable land	Percent agricultural land
Cultivable Land[a]			
General crops	1,300,714	23.5	6.0
Fruit trees, vineyards	179,973	3.2	0.8
Forage	487,367	8.8	2.8
Fallow	665,440	12.0	3.1
Grassland	2,909,887	52.5	13.4
Total Cultivable Land	5,543,381	100.0	26.1
Agricultural Land[b]			
Forest plantations	422,535	...	2.0
Natural forest	3,632,114	...	16.3
Pastures	7,421,313	...	34.3
Natural pastures (on hills)	4,617,718	...	21.3
Total agricultural land	21,637,061	...	73.9
TOTAL LAND	74,177,000	..	..

[a] Cultivable land is defined by the Census as that which has been plowed at least once during the last 10 years.

[b] Agricultural land refers to all surface recorded by the Census excluding deserts, rivers, lakes, cities, mountains, or other settings not usable for agricultural purposes.

Source: *Censo Nacional Agrícola Ganadero*, 1955, Chile.

* One hectare is approximately equivalent to 2.5 acres.

correspond to cultivable land, out of which 1.3 million hectares are irrigated. Approximately 30 percent of the total farmland is in forests and pastures (see table 1).

In spite of this fact Chile has more than enough cultivable land to feed its population of approximately 9 million. There is about 1.8 acres of cultivable land per capita, an amount which is close to the 2.2 acres available in the United States.[4] However, the land problem in Chile evidently lies in the misuse of this natural resource. For instance, 64.5 percent of the total cultivable land (5.5 million hectares) is used in natural grass and fallow, while only 26.7 percent is in crops, fruits, and vineyards. This indicates insufficient use and consequently low productivity of the land. The natural conditions of climate and soil require the use of irrigation for agriculture. However, as pointed out above, only 1.3 million hectares are irrigated. Paradoxically, almost one-half of this irrigated land is in natural pasture. It is necessary to use between 2 and 8 hectares to feed a cow with this pasture. If this same land were cultivated with forage one hectare could feed up to three cows.[12]

Also related to the misuse and lack of attention to the land is the problem of erosion, which has been called "the worst ghost of the Chilean soil."[12] About 4 million hectares are regarded as critically eroded.

Another striking point in Chilean agriculture is the land tenure system. According to the 1955 Census, there were approximately 150,000 farms in Chile. Today land distribution still varies between two extremes, the large landholding system (Latifundio) and the small property system (Minifundio). Large landholding is predominant, with about 50 percent of the arable land in 5 percent of the farms. These farms are larger than 250 hectares each. At the other end of the scale, farms with less than 20 hectares each account for only 2 percent of the arable area but include 66 percent of the farms.[4] This unequal distribution of the land is one of the major problems for rural improvement in terms of both productivity and the social conditions of rural workers. For example, of the people in agriculture there are about 117,000 submarginal property owners, 82,000 *inquilinos* or resident farm laborers, 27,000 sharecroppers, 15,000 caretakers, and 180,000 transient farm workers. Thus, Chile's rural underprivileged group exceed 420,000 families.[9]

Of the total agricultural population, 8 percent are landlords (patrones). The remaining 92 percent constitute the labor force. The *patrones* receive 59 percent of the total income of the land, while the agricultural workers receive only 41 percent. Recent reports, however, indicate that the *patrones* invest only 12 percent of their total income in improvements of their operations.

The Population

The general trend of development in Chile during the last decade has changed certain features of the population distribution in urban and rural areas.

By 1952 about 40 percent of the population was rural. This figure decreased to 33 percent in 1960.

Despite this relative loss for the rural population, agriculture still is considered one of the main activities of the Chilean people. About 27 percent of the total labor force of the country is employed in agriculture.

Between 1952 and 1960, the active population — defined in terms of those individuals older than 12 years of age working or individuals over 12 who are potentially able to work — increased about 9 percent. Although the percentage of the total population in the agricultural sector declined from 30.1 percent in 1952 to 27.5 percent in 1960, the absolute number of individuals employed in agricultural activities did not change between both censuses. Agriculture

still holds the highest proportion of the labor force in comparison with other sectors of Chile's economy.

The rural population of developing countries pays the highest toll in terms of living conditions and social problems. For instance, in Chile over 30 percent of the rural population is illiterate, while the average illiteracy rate for the country as a whole is about 12 percent. Lack of schools, teachers, and other elements in rural areas, contribute to this situation, which is certainly critical considering that 44 percent of the rural population is younger than 15 years of age. Living conditions, health facilities, sanitation, housing, and other basic commodities are still deficient for most of the 2.5 million Chileans living in rural communities.

Working conditions have followed a slow pattern of progress. Although social legislation protecting the labor force engaged in agriculture has existed for several decades, its actual application has been enforced only in the last few years.

While in urban areas labor union organizations have been developed simultaneously with the rise of new industries and other sources of work, among the agrarian labor force unionism or even other kinds of formal or informal organizations is just beginning. Only in 1947 was a law approved which gave agricultural workers the right to establish labor unions. However, this law included so many requirements that in 1965, almost 20 years after the law was approved, there were only 22 rural unions with no more than 1,800 members.[12]

In 1960, 85 percent of this agricultural population received a net income of less than $325 (including wages and other benefits). At the same time, nearly one percent of the landowners who had farms with more than 1,250 acres had an average income of $22,000 per year. Five percent of those employed in agriculture received 50 percent of the income.[33]

Lag in Agricultural Production

The unfavorable balance of trade in agricultural products supports the conclusion that Chile does not produce as much food as is needed by the population. In 1939 Chile had a favorable balance of trade in agricultural products. She exported more than twice as much food as she imported. The exports were valued at 24 million dollars, while the imports were valued at 11 million dollars. By 1946 the export-import situation had changed to an unfavorable balance of trade in agricultural products. In that year, the exports equalled 47 million dollars in value, while the value of the imports exceeded that figure by 10 million dollars.

By 1961 the unfavorable balance of trade had grown considerably, with the absolute value of the exports declining and the absolute value of the imports rising. The value of exports was only 37 million dollars, while the imports were valued at 122 million dollars.

By 1964 the balance of trade had reached even more unfavorable proportions, with exports valued at 39 million dollars and imports at 159 million dollars. The value of agricultural imports had increased to a level about four times that of agricultural exports. However, only 37 million dollars of the imports were products which could not be grown in Chile.

A trend in the direction of an increasingly unfavorable balance of trade may be expected on the basis of rates of growth in both the population and food production. Over the last 10 years agricultural production increased at an annual rate of 1.8 percent while the population increased at a rate of 2.5 percent annually. It is expected that the population of Chile will reach 12,000,000 by 1980, compared to 7,347,115 in 1955. Projections of the population indicate that the Chilean population may double every 30 years. It seems reasonable to assume, therefore, that the shortage of agricultural produc-

tion in Chile will reach more serious proportions in the future.

The lag in agricultural production has critically influenced the general economy of the country. The Gross National Product (GNP) grew at a rate of about 3.3 percent annually between 1958 and 1962 (measured in 1961 prices). However, on a per capita basis the GNP increased only one percent per year.

Agricultural contribution to the total national income in 1940 was 17.9 percent; in 1950 it decreased to 16.7 percent. By 1958 it dropped even further to 13.6 percent, and at the present it is estimated at not higher than 12 percent of the national income.

Malnutrition is one of the most serious results of the lag in agricultural production. It is perhaps the one problem which needs to be solved most urgently on behalf of the present population and the Chilean generations of tomorrow.

For example, today the Chilean population eats less than it ate 15 years ago, and a high proportion of the people eat less than the minimum amount recommended by nutrition experts. About 60 percent of the school-age population is reported not to drink milk. Approximately 20 percent of them are anemic, and 70 percent show some symptoms of rickets.

The level of milk consumption also indicates malnutrition. Between 1951 and 1957 the Chilean population consumed an average of 106.1 liters of milk per year. By 1959 milk consumption was only 99.3 liters. Presently consumption of this product has increased, due only to supports and donations by international welfare agencies.

In 1962 the deficit of milk reached 30 to 40 percent, and there was a 20 to 30 percent deficit of meat and fish and a 25 percent deficit of legumes and other vegetables.

Goals For Chilean Development

The 10-year National Program of Economic Development, 1961-1970, was developed to meet the problems afflicting the progress of Chile.

Considering that it is not possible to achieve an adequate economic development if a substantial increase of agricultural production is not attained, the program gives specific priority to monetary investment in this sector. About one billion dollars is to be used in agricultural improvements including technological aspects, transportation, credit to farmers, marketing facilities, and others.

Agricultural production is expected to increase by 62 percent during the decade 1961-1970. Plans are to expand irrigated land by 27 percent and agricultural exports are projected to raise 140 percent.

Also, the new land reform program strives to establish 100,000 new landholders in order to accomplish, among others, the following objectives:

1. A better distribution of cultivable land by transforming the present patterns of land tenure and maximizing the ultilization of land and water resources;
2. Expansion of the total output of the agricultural sector by increasing the productivity per capita in rural areas;
3. Improvement of standard of living of rural families and agricultural workers.

Some basic measures to improve working conditions of the rural labor force have been taken during the last 4 years. By reinforcement of old legal dispositions and by promulgating new laws, the following accomplishments have been reached.

1. Agricultural wages increased 62.9 percent as an attempt was made to level off minimum industrial wages and incorporate most of 350,000 rural families into dynamics of the national economy.

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2. Family pensions under the social security system were increased from 4.9 escudos (on December 31, 1964) to 13.8 escudos. Execution of this item needs to be reinforced, considering that by 1961 Chilean workers lost about 25 million dollars when about 800,000 family pensions were not paid by the *patrones* in rural as well as urban areas.
3. The agricultural work schedule was limited to a maximum of 8 hours per day, as it is for labor in industry and other sectors.
4. To avoid unemployment and possible persecution against rural workers, a new law which guarantees immobility of occupations was promulgated.
5. Social organization of rural communities and technical assistance to farmers have been initiated.[22]

Despite these achievements, which eventually will benefit the total national economy, Chile is still facing the basic problem of increasing its agricultural production.

The Research Problem

The discrepancy between agricultural production and needs of the population has created an important dilemma in Chile. Its causes may be attributed to many factors which operate as counterforces against the general development of the country.

Instead of discussing ultimate causes involved in the agricultural lag afflicting the national economy, the task here will be to attempt to provide an answer to the question, "How can the trend of development of Chilean agriculture be accelerated?"

It is assumed that the concurrence of two closely interwoven factors is necessary to attain the goal of accelerated agricultural production. These factors are: (1) The communication and diffusion of new ideas, programs, and technologies; and (2) the acceptance and actual adoption of recommended farm practices and technological improvement.

The analysis of variations of these two factors which, for the purposes of this study will be treated as dependent variables, constitutes the formulation of the research problem.

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Communications and Development

During the last decade, the close association between mass communication and socio-economic development has been pointed out by several studies.

A recent study by UNESCO indicates that "there is a high correlation between availability of information media and economic factors of national development, especially income."[34] Similarly, Schramm emphasizes the idea concerning the interplay between development and communication. This author remarks that "undoubtedly there is a powerful interaction" because "new developments in communications affect society, and new developments elsewhere in society affect communication."[30]

A close analysis of this last statement brings a dimension which is frequently underestimated by numerical reports or the purely economic approach concerning stages of development. This is the psychosociological dimension. First, this dimension suggests that it is not enough to measure degrees of development and to derive conclusions in a static way, usually done by correlating two or more variables.

Secondly, a quantitative approach that only assesses a minimum amount of information media per inhabitant in a country is not sufficient to correctly understand the relationship between communication and socio-economic development in that country. UNESCO, for example, has suggested that a country may be considered developed in terms of its communication system if the country has at least ten copies of daily newspapers, five radio receivers, two cinema seats, and two television receivers for every 100 persons. As a crude index representing general availability of information media, that recommendation is acceptable. However, in order to enter into a dynamic analysis of communication and socio-economic development, it is necessary to bring into play other factors which deal with socio-psychological aspects of industrial progress and the communication process.

Communication and Social Change

It has been said that economic development also requires a social transformation. Schramm points out that "if national economic development is to occur, there must be a social transformation, and in order for this to happen, human resources must be mobilized and difficult human problems must be solved."[30] For the purposes of this report, social transformation is defined in terms of social change. According to the Agency for International Development, social change is usually thought of as a series of actions which make a thing progressively better.[35] This definition implies that change is essentially dynamic; under that assumption sociologists talk about it as a process. Consequently major attention should be given to the dynamic interaction between communication and social change. Concerning social change, inevitably it is possible to state that mass media, while a necessary condition in promoting change, is *not a sufficient* condition. In other words, it is

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not enough to increase the number of radios, newspaper circulation, and cinema seats per inhabitant to achieve an equivalent rate of social change.[30] It is within the framework of social change where the relations between mass media and national development can be made more meaningfull.

One of the most representative studies in the area of social change was made by Daniel Lerner in *The Passing of Traditional Society.*[15] Lerner, whose main contribution is his Western model of modernization, focuses attention on the process of social change as related to communication, whether personal (face-to-face) or mediated by mass media. One of his main propositions is that a communication system is both the index and agent of change in a total social system.

Analyzing the sequence in the social change process followed by Western countries, Lerner states that "everywhere, for example, increasing urbanization has tended to raise literacy; rising literacy has tended to increase media exposure; increasing media exposure has gone with wider economic participation (per capita income) and political participation (voting)."[15] Although patterns of modernization tend to follow this sequence found by Lerner, it is important to keep in mind what may be called "the unanticipated consequences" of modernization.

One of these unanticipated consequences is the rise of expectations generated by modern societies upon people who still live in developing areas. New expectations create new needs and desires to reach new positions, even scrapping certain phases of development. Another consequence may be that of unbalanced development between different sectors of the national economy. This not only creates problems in achieving a general harmonic modernization within a country but also social conflicts among urban and rural populations.

Studies on Communication and Diffusion in Programs of Development

Since the Extension Service of the United States Department of Agriculture became interested in evaluating the effectiveness of its extension methods during the second decade of this century,[24] the number of research studies dealing with the process of communication, diffusion, and adoption has increased.

Among the first sociological studies done in this field were those conducted by Wilson,[39] who pointed out the relationship between communication media and adoption of farm practices. Later, studies reported by Hoffer,[13] and by Ryan and Gross[25] contributed to establishing the "cornerstone" of interdisciplinary studies.

Theoretical as well as empirical efforts have been extended by disciplines such as sociology, communication, psychology, and anthropology in the joint enterprise of creating a better understanding of the process of social change connected with diffusion of innovation and adoption of new ideas, techniques and social values.

However, if it is true that the interplay of theories and methods belonging to these different branches of social sciences has enriched the academic atmosphere of each individual discipline, it is also true that many fruitful consequences have been derived from such interdisciplinary studies on diffusion. Practical results in connection with the socio-economic development of emerging nations may be considered as one of the central contributions of these studies.

For example, the underdeveloped condition of Chilean agriculture is the common denominator of most, if not all studies on Chile. More recent publications (The Chilean National Program of Economic Development; Berg, Hanson, and Martin's Report; Doyoe; Nelson; Schmitt and Burk; Sternberg; Thiesenhusen) agree on these points: (a) insufficient agricultural and food production; (b) lack

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of a dynamic agricultural extension service; and (c) need for sociological, economical, and technical research. No studies are known to have been conducted on communication, diffusion, and adoption of agricultural practices in Chile. Only a few researchers in other Latin American countries (Montalvo; Deutschmann and McNelly; Fliegel and Oliveira; Calderon) have shown the importance of knowing socio-cultural aspects of rural communities as a first step to economic development, land reform programs, and agricultural improvement. Communication as a basic element to processes of diffusion and adoption of new agricultural technology is emphasized in these studies.

Studies conducted in the United States help establish a theoretical framework and suggest new propositions for cross-cultural studies and research on communication processes, diffusion, acceptance, and adoption of farm practices. Wilkening has pointed out what he calls "A Socio-psychological Approach to the Study of the Acceptance of Innovations in Farming;"[36] he stresses communication sources and information for improved farm practices.[37] In two reports Ryan and Gross analyze acceptance and diffusion of hybrid corn seed in two Iowa communities.[26] Lionberger presents the relation of informal social groups, the community social structure and diffusion of farm information.[17]

The Frame of Reference and Methods

The frame of reference selected as the guide for this study was "The Adoption process."[1] Five main stages were recognized in the following sequence:

1. *Awareness:* At this stage the individual has a general knowledge about the existence of a new practice but lacks details about it.
2. *Interest:* The individual is motivated to look for more complete information about the new practices.
3. *Evaluation:* The individual considers the relative advantages or disadvantages of the new practice in relation to his own interests and situation.
4. *Trial:* The individual has been motivated to try the new practice. Usually the trial is on a small scale.
5. *Adoption:* This stage implies the actual practice of the new technique during a period of time.

For the purposes of this study, three dependent variables were analyzed in relation to a series of independent variables:

1. Exposure to mass media
2. Exposure to technical agricultural communication
3. Adoption of recommended farm practices

Exposure to mass media was defined in terms of the farmers' use of available public information channels such as radio, newspapers, magazines, books, and motion pictures.

To measure the degree of use of these information sources, an "index of mass media exposure" was constructed. The index combined all five communication channels into an exposure score which was assigned to each individual respondent. Because an equal weight was given to each medium, a farmer's exposure score might range from 0 to 5, according to the actual number of information channels he regularly used. Thus, a maximum score of five points indicated that the farmer was highly exposed to all five types of mass media, while a zero score showed that the individual respondent did not use any of these channels.

Exposure to technical agricultural communication was defined as the use of available specialized media such as agricultural radio programs, farm journals, agricultural bulletins and the farmer's contact with the agricultural extension service. Based upon equal weight assigned to each

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medium, an exposure score was computed for each individual farmer. The combination of these scores, which may range from 0 to 4, constituted the index of technical media exposure.

Adoption of farm practices was defined as the actual use of a series of four selected farm techniques recommended by agricultural extension services of the Ministry of Agriculture. A minimum of two consecutive applications by farmers of those selected farm practices was considered adoption.

The four selected practices were the use of nitrate, herbicide, phosphate, and certified seed. These highly recommended farm practices met the following criteria:

1. They had been recommended by technically competent authorities (i.e., Chilean Ministry of Agriculture);
2. They had been tested and improved by Agricultural Experimental Stations;
3. They had been found applicable in the area of the study considering factors such as weather, soil conditions, and type of agricultural production;
4. They had been recommended during the last 5 to 10 years.

To measure the level of adoption, the four recommended farm practices were selected in order to construct an index. Such an index was based on an adoption score which was defined in terms of the percentage of applicable practices adopted by the farmer. Those farmers who applied all selected and recommended practices would have a score of 4. Thus, the adoption score might range from 0 to 4, indicating the level of adoption shown by interviewed farmers.

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Characteristics of the Province of Colchagua

The province of Colchagua, located in the central valley of the country approximately 90 miles south of Santiago, is considered one of the most representative rural provinces of Chile. According to the 1960 census, its total population is 158,509; of this total 67.31 percent live in rural areas. The province is second only to Chiloe in proportion of rural population.

In the last three decades Colchagua has experienced a slow population increase, from 125,435 in 1930 to 138,036 in 1940, 139,531 in 1952, and nearly 159,000 in 1960. Urban centers are few and with a relatively few inhabitants. The largest one is the capital of the province, San Fernando, which has a population of slightly more than 21,000.

The province of Colchagua has a surface area of 8,326 square kilometers, placing it nineteenth in land areas among the 25 Chilean provinces. It has two departments, San Fernando and Santa Cruz. San Fernando has 3,106 square kilometers distributed into the following comunas: San Fernando, Chimbarongo, Nancagua, and Placilla. These comunas have a total population of 70,450. Santa Cruz, with a surface area of 5,220 square kilometers and a population of 88,093, is divided into the following comunas: Santa Cruz, Lolol, Palmilla, Peralillo, Marchigue, Rosario, Pichilemu, Pumanque, Chepica, Paredones, and La Estrella.

Economy of the Area

The economy of the province is based mainly on its agriculture. Presently, it has a total surface area of 658,731 hectares, of which about 595,000 hectares are considered as potential for agricultural work. The land is utilized as follows:

Agricultural land . . 240,000 hectares
Managed forests . . . 6,465 hectares
Natural forests . . . . . 6,065 hectares
Natural grass . . . . 175,173 hectares
Natural grass
on hills . . . . . 167,731 hectares

Other economic resources for this area besides agriculture are limited. The contributions of mining and industry to the economy of the region are insignificant. Only a few industries with operations being related to or dependent upon agriculture exist in the area.

Communication and Transportation

In spite of its proximity to the capital of the country the province of Colchagua and most of its urban and rural areas still lack modern communication facilities. In 1962 the province had over 1,500 kilometers of roads, out of which only 35 were paved. In 1965, the total kilometers extended to 3,280 kilometers, with only 80 paved kilometers.

The province has north and south railway service for 40 kilometers and one branch of 119 kilometers that connects the cities of San Fernando and Pichilemu, a town located on the Pacific coast. The railway is generally more dependable than the roads throughout the year.

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Telephone service is limited to the main urban centers. There are still many places without this service.

To provide additional communication in view of the inadequate telephone facilities, mail and telegraph services have been emphasized. There are 26 telegraph stations, of which 24 are operated by the state and two are private companies. Also, there are 49 mail stations.

The Sample

A stratified, random sample without replacement of 244 farmers of three rural communities — San Fernando, Placilla, and Chimbarongo — of the province of Colchagua was selected.

Table 2 shows how the sample distribution of farm size compares with the 1965 Agricultural Census, excluding operations with less than one hectare.

These data show that small operators constitute the largest proportion in the sample as a consequence of their high proportion in the population, while middle-size farmers and large operators constitute low proportions in the population as well as in the sample.

Individuals holding an area less than one hectare were eliminated from the sample, because these extremely small units do not make a significant contribution to agriculture. Also, adoption of new practices and techniques implies decision-making which is less likely to occur on units of less than one hectare.

The main instrument for the collection of data was a questionnaire that included open-end as well as open questions. The schedule was prepared in English and later translated into Spanish and adapted to Chilean language and expressions.

Field Research

The field work was conducted in 1965 during the winter months of Chile: July, August, and early September.

During the first two weeks of August — after selecting the area to be studied, communicating with government agencies and academic institutions and receiving generous collaboration from local organizations from the province of Colchagua — a brief but intensive training period for interviewers was conducted. Some of the selected interviewers had had previous experience in survey research working for the Agricultural Census a few months before. Others were currently working as social agents or *promotores* for the National Institute of Agricultural Development *(Instituto de Desarrollo Agropecuario* — INDAP) engaged in community development programs in the province.

Table 2. Comparison of farm size distributions of the sample population with the Chilean Agricultural Census of 1965

Categories	Agricultural Census 1964-65		Stratified random sample	
Province of Colchagua	number	percent	number	percent
Small farmers (less than 10 hectares)	2,025	80	175	72
Middle-size farmers (10-100 hectares)	335	13	45	18
Large farmers (over 100 hectares)	164	7	24	10
TOTAL	2,524	100	244	100

During this two-week training period a pre-test consisting of 30 interviews of local farmers was undertaken.

Some of the problems and limitations of the study also should be mentioned.

First, practically all the field work was conducted during one of the worst winters in the history of central Chile. For several weeks the country lived under conditions of national emergency as a consequence of rains and floods. Communications in some areas were interrupted temporarily, and in some places the government had to evacuate thousands of families.

The damage and loss suffered by the province of Colchagua was reported as among the highest of the country in terms of the agriculture and living conditions in the rural areas. A preliminary report dated August 20, 1965, indicated losses of about one million dollars for that province. Considering only damage in rural areas and agricultural installations, the report indicates that a total of 145 houses, barns and other buildings were demolished by the winter hurricanes.

The rains and floods also imposed limits on the survey, as well as problems of transportation and communication. In addition to this unusual Chilean winter, another limiting factor was the Camelot Project, which as far as the social sciences are concerned could be considered a "sociological tornado."

Project Camelot was an unsuccessful attempt by the Special Operations Research Office of the American University of Washington to establish a large-scale social study on internal warfare in some representative countries in Latin America. Chile was selected as a representative Latin American country together with Argentina, Uruguay, and Costa Rica. As the report of research design of this project indicated, focused attention was given to "such substantive areas as voting behavior, power analysis, legislative behavior"[28] and other dimensions of the social structure of Latin American countries.

Project Camelot had been introduced in Chile as sponsored by the National Science Foundation[32] but it was discovered that the Department of the Army was the actual sponsor. The Department of the Army supported the project with an initial $6 million for three to four years of socio-political study of internal warfare, pre-revolutionary conditions and available elements for "guerrilla warfare" or counter-revolutionary operations.

The immediate reaction of Chilean social scientists was to firmly reject and condemn any connection and collaboration with Project Camelot. Further, their traditionally favorable attitude toward assisting or providing helpful advice to foreign social scientists engaged in research in Chile turned into understandable doubt about the true nature of those studies.

Project Camelot was labelled an American "plan of espionage" and publicized as political interference of the Pentagon into domestic politics of Latin American countries. The Chilean government presented a diplomatic protest to the State Department. The fact that the American Embassy in Chile did not have information concerning the research proposal sponsored by the Department of the Army was widely exploited by the local press as another sign of military interference in internal Chilean affairs.

Silvert, reporting the research conditions in Chile in July 1965, stated: "At this moment, not a single survey research study can be done in Chile. Throughout Latin America quantitative studies have halted or been impeded, and all scholars, whether in teaching or research, find their actions questioned in direct correlation with the sophistication of the persons with whom they deal."[32] Several studies conducted by North American social scientists and Chilean scholars, and one of Silvert's own research

undertakings in Chile, were paralyzed.

Thus, the increasng confusion and consequent suspicion concerning the nature and objectives of this study was one of the main problems to be faced in the field work. However, after consultation with Chilean sociologists from the Catholic University, the University of Chile, and after proper identification with government officials and institutions dealing with agricultural development, this survey research was launched.

To avoid possible problems with national and local authorities, an identification letter from the Department of Sociology of the University of Minnesota was presented to farmers. Also, to explain the nature of the study and its scope, each interviewer carried a letter of introduction in Spanish to be read to each farmer at the time of the interview.

In spite of all the precautionary measures taken before and during the collection of data, it is felt that the field work of this study might nevertheless have suffered as a result of Project Camelot.

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CHARACTERISTICS OF THE SAMPLE POPULATION

The Farmer's Origin

The unit of analysis in this study was the owner or farm operator* working in agricultural activities and living within the geographical limits of the three "comunas" of San Fernando, Placilla, and Chimbarongo.

Among the 244 farmers interviewed, the highest proportion (80 percent) were born within the limits of the province, located in the central valley of Chile, and specifically in the three communities where they work. Approximately half of them were born in the Comuna San Fernando which has the largest city and the only hospital in the area.

In relation to other regions of the country, the highest majority of the respondents (96 percent) were born in the central valley of Chile between Coquimbo and Concepcion, with the two neighobring provinces (O'Higgins on the northern border and Curico to the south) being most commonly reported as place of birth.

Sex Distribution

Of the total farmers, 82 percent were male; 18 percent were female.** Approximately eight out of ten women in the sample were widows or separated from their husbands. Also, nine out of ten operated small units of less than 10 hectares.

Age

The median age of the respondents was 53.9 years. Only 5 percent were younger than 30 years of age, while three out of ten farmers were older than 60 years. Among the male population, the median age was about 51.8 years; for women, it was 60.7 years. Over one-fourth of the farmers belonged to an older age group which, under certain circumstances, might offer some resistance to innovation and technological change needed in agriculture.

This age distribution may be regarded in relation to the condition of ownership and functions of management performed by the respondents and, thus, a certain mature age might be expected. On the other hand, it might also be a reflection of a migration flow of the younger population toward urban areas and cities.

Education

The educational level of the sample population measured by the total number of years school attended is reported separately for men and women.

While the illiteracy rate for men was 10 percent, in the female population it was found to reach 20 percent. In both cases the majority were individuals holding small land units (less than 10 hectares) and over 65 years

* A farm operator is defined as a person who operates a farm either performing the labor himself or directly supervising it. He may be an owner, a hired manager, or a tenant.

** There is a higher probability of finding women working in agriculture when dealing with small land units than when dealing with large farms. Most of the time they are widows holding reduced units of land for subsistence of themselves and their families.

of age. For the total sample, the illiteracy rate was 12 percent.

The median number of years in school for the total sample was about six, which indicates a completed elementary education. While one-fourth of the respondents had received some secondary education, only 3 percent had attended college. It should be noted that only the male population had some type of college education. The median number of years that the women attended school was 4.5 years, which indicated an incomplete elementary education for half of the literate female respondents.

Less than 3 percent of the sample population reported having studied agriculture or technology. Only 12 percent of the literate persons had some degree from a college or technical school, and seven persons had a degree in agriculture or related disciplines.

The Family

Almost seven out of ten of the respondents were married, 18 percent were widows and 13 percent reported being single.

The family structure presented certain characteristics of the economic enterprise where the members of the group, parents, and children participated in working their land. This was especially common among individuals who belonged to a large family system holding small units of land. The median number of children in the family was approximately five. Only 11 percent of the married respondents had one child, while almost one-fourth of them reported having six or more children.

Further analysis of the data indicated that four out of ten informants had some of their children working in agriculture and over 60 percent of this proportion had at least one of their sons working for him at his farm.

The participation of children in the agricultural work of their parents appeared to be positively associated with a large family system and age of the farmers. Almost nine out of ten informants who had children working for them on their farm also had over three children in the family. Almost 45 percent of them were families with five or more children. In relation to the respondents' age, it was found that 62 percent were over the median age of the sample population; that is older than 54 years.

However, while age and family size are positively related to children's work on their parents' land, farm size presents a negative relationship. Over three-fourths of the respondents with working children operate small units of less than 10 hectares. Among large farm holders, only one case was reported in this category.

Another finding which seems to support the statement that the farmer's family participates in the cultivation of the land is that the majority of the farmers' wives did not have other activities besides housekeeping and domestic contributions to farm support. Only three percent of the respondents' wives indicated having a remunerative activity, small commerce being the most popular.

Land-tenure and Farm Operation

In contrast with industrial patterns of ownership characterized by the separation of the worker from direct ownership of machinery, tools, and other goods of production, agricultural enterprises in Chile retain the traditional patterns in which the relation of man and land seems to be linked to legal dominion and status given by ownership.

As was expected, the majority of the farm operators of the sample (81 percent) were owners, while 12 percent were tenants, 4 percent were managers, and 3 percent were sharecroppers and employees.

Almost six out of ten farm operators interviewed had inherited their land from their parents, who in most of the cases also were farmers. When the respondents were asked about

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their fathers' occupations, over 80 percent of them reported agriculture and farming activities. Among farmers currently operating small farm units, a large proportion of almost 60 percent had fathers who worked as managers and laborers on farms. Also, about 30 percent of the respondents operating small units indicated that their parents used to work their own land.

This high proportion of respondents having fathers involved in farming might be considered related to the traditional manner of land inheritance and the continuation of family activities.

A large proportion of the respondents (83 percent) indicated that they had always been farmers. Only 17 percent of them had performed activities outside agriculture. Small commerce within the geographical area where they currently operated was the type of job which accounted for over half of those who entered farming activities later.

The highest proportion of the respondents (91 percent) were full-time farmers and only 23 who held less than 10 hectares indicated they had another job outside farming to supplement their income.

Farming experience measured by the median number of years in agriculture was found to be 29 years for the total sample. However, in those cases where the father's occupation was farming, this index rose to over 30 years.

Social Status and Standard of Living

Chile has a relatively large middle class which seems to serve as a balance between high social class of an economically wealthy minority and a large mass of people in the working and low social stratas.

In rural areas the lines of stratification appear to be sharpened by the contrast between the large number of peasants and farm laborers and the small number of landlords and *patrones*.

Because the capacity and opportunity for achievement and acquisition vary from one individual to another, even in dealing only with farm operators, it is possible to find demarcation lines for vertical social differences.

Literature suggests three main criteria for the analysis of social stratification: functional utility of activities performed by individuals; personal and social attributes; and possessions, which usually refer to the economic prosperity of the young.

It is also commonly accepted that in evaluating the socio-economic status these three criteria are generally considered by respondents when they are asked to place themselves on the ladder of social stratification.

To measure the relative position of respondents in the social structure of their rural communities, two major items were considered. One was the self-evaluation of SES (socio-economic status) by the farmer, and the second was the evaluation made by the interviewer. These two sources of SES evaluation showed a high level of agreement. The product moment correlation between values for these two measurements was quite high ($r = .97$). In both cases the proportion of farmers high in SES was small (less than 5 percent), while the middle class categories included almost three-fifths of the respondents. The working class group that might be considered as an upper-low category included over one-fourth of the farmers.

This SES distribution was also closely related to seven traits that reflected housing and living conditions of the respondents. These items were: telephone, car or truck, electricity, indoor bathroom facilities, water pipe inside the household, maid or domestic service, and kitchen facilities separated from bedroom, living room, or other living space of the house.

As stated earlier, telephones are scarce in Chilean rural areas. In the province of Colchagua phones are mostly limited to urban centers, and

only a very few large farms can afford them. Nine percent of the farmers had telephone service, and all of this group operated large farms and ranked high or middle-high in the SES scale.

About one-fifth of the respondents reported owning a car or truck. Most of them enjoyed a high or middle-high SES. Almost all farmers in the lower social stratas were without these possessions.

Domestic service is still traditional in Chilean families especially among large farm owners. About 20 percent of the respondents indicated having at least one maid in their homes. Among farmers with high SES, the number of maids and other personnel for domestic services was larger.

Among housing facilities four items were found to be related to SES level.

First, the majority of the respondents had a kitchen room separate from other living headquarters of the house, with the exception of about 17 percent of small farmers with low SES.

Likewise, electricity was limited to aproximately six out of ten households in these rural communities. Almost 70 percent of the farmers lacked indoor bathroom facilities and there were no water pipe facilities in at least three-fourths of the houses of respondents. Thus, it was only a small number of farm operators holding large units of land and enjoying higher ranks in terms of the SES scale who also possessed some of these basic commodities, while the large majority of farmers with middle-low and low SES had a considerably lower standard of living.

Social Participation and Community Life

To a large extent the organizational structure and dynamic aspects of a community are reflected by the number, nature, and vitality of formal and informal social organizations in which individual members participate and interact with others.

Results from a four-item scale of social participation in terms of membership, attendance at meetings, money contribution and leadership in organizations show that membership and participation of Chilean respondents in formal groupings involved no more than 20 percent of the farmers.

The fact that all those who reported membership in some formal organization also indicated money contribution to organizational activities may reflect that payment of fees and dues are basic requirements for becoming members of those organizations. It is also one of the limiting factors for larger membership and participation of small farmers and low income individuals.

The nature and types of formal groupings can be classified into four types: (1) farmers' associations, which are social in character and limited to large farm owners; (2) farmers' cooperatives, with aims to combine efforts in one or more stages of farm production, services, and others. Only three percent of the respondents reported membership in this type of organization; (3) sport clubs, which attempt to promote and provide recreation and social activities. Almost one out of ten respondents indicated membership and some kind of participation in these groups; (4) political parties, whose local organizational branches are highly dependent and necessarily connected to the national political organizations. Although a relatively low proportion of farmers (15 percent) indicated membership in political parties, a large majority of them (80 percent) showed preferences for some political line of action loosely defined in terms of rightist, center, or leftist. Only one out of ten respondents declared themselves politically independent. One-third of the farmers located their preferences in the center of the road, while 28 percent indicated preferences toward a center-left position, and eight percent agreed with a radical-left line of action.

Besides these four types of organi-

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zations, there were no other visible groupings within these three rural communities. Religious, educational, recreational, or other kinds of formal or semi-formal groups were concentrated in urban centers. For instance, in spite of the fact that religious affiliation is high (over nine out of ten farmers reported to be Roman Catholic, four percent Protestant and two percent members of other religious denominations), there were no organized groups besides the few churches scattered within the province.

Thus, the community life of farmers from San Fernando, Placilla, and Chimbarongo can be characterized by a conspicuous absence of organizational structures that could provide some dynamism to that traditional pace of country life. A critical observation of this situation makes one wonder if there are in this area other factors besides geographical boundaries allowing the identification of well-defined rural communities.

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AVAILABILITY AND EXPOSURE TO MASS MEDIA

Countries engaged in general programs of national development find in some of the elements of mass communication media the basic tools to accelerate and channel the changes which are necessary in traditional societies. Likewise, in programs regarding specific areas of technological change, the processes of diffusion and innovation depend to a great extent on the communication channels available to the people.

Concerning what has been considered by UNESCO as a minimum standard of mass media development, Chile appears to be in an advantageous position in comparison with the other Latin American countries. UNESCO maintains that a country has achieved a certain degree of development in terms of its communication system if it has at least ten copies of daily newspapers, five radio receivers, two cinema seats and two television receivers for every 100 persons. In Chile there are 13 newspapers, 10 radio receivers and over 5 cinema seats for every 100 persons. Although there is no recent information regarding the actual number of TV sets among the Chilean population, this communication channel is relatively new in the country and has been increasingly developed during the last 5 years.

At the time of the study, over a dozen daily metropolitan newspapers were available to the inhabitants of the three communities. Besides these newspapers with national circulation, two local papers were published three times weekly, one on Monday, Wednesday, and Friday and the other on Tuesday, Thursday, and Saturday. Only 5 percent of the farmers interviewed subscribed to or regularly bought at least one of these two local newspapers. These figures indicate that the possibilities for expansion and improvement of the local papers are extremely limited.

Considering only those newspapers which have a large national circulation, *El Mercurio* appears to be more widely circulated than all the other newspapers. About two-fifths of the respondents indicated that they subscribed or regularly or occasionally bought this paper. In second place, with about one-third of the subscribers and usual buyers, was *La Tercera*, a middle-of-the-road tabloid which usually offers rather sensational perspectives of the news. In spite of having a small number of subscribers and regular buyers, *La Tercera* had a large proportion of occasional buyers among farmers. Possible explanations of this pattern of distribution include *La Tercera's* sensationalist content, provocative headlines, wide use of graphic material, and short news stories written in popular language and sometimes mixed with colloquialisms. The government newspaper *La Nación* held third place among this farmer audience; 10 percent of farmers either subscribed to or bought this paper locally. The communist spokesman *El Siglo* appeared to have no circulation among the farm operators interviewed, while the conservative paper *El Diario Ilustrado* circulated among 4 percent of the farmers. Although the sensationalist tabloid *El Clarin* (leftist in political orientation) did not have subscribers among the respondents at

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the time of the study, about 3 percent of the respondents reported to be occasional buyers of it.

There exists a possibility that farm operators who were neither subscribers nor occasional buyers might have received the papers from neighbors, relatives, friends, or other individuals in the community. Although several studies in the field of mass communication have pointed out this informal pattern of diffusion of printed material, especially in rural communities, our respondents appeared to have followed the formal patterns of distribution by subscribing to or buying the papers directly. Less than one percent of the farmers indicated occasionally receiving some newspaper from other individuals.

As far as magazines are concerned, there are a large number of weeklies at the national level. Their content varies from those of general interest with emphasis on news to those which are oriented toward specific audiences interested in such fields as sports, political satire, fashion, and comics.

About 6 percent of the respondents subscribed to *VEA*, a rotogravure weekly of general interest with emphasis on pictures and graphic presentation. *Ercilla*, another weekly magazine with a large national circulation, had a subscription rate of 4 percent among the farmers.

At the time of the study no magazine of large circulation dealt with agricultural activities or specialized in matters of interest to a farmer audience. However, there were a few regular magazines with limited circulation which were oriented toward the farm audience, such as *El Campesino* (The Farmer) and *Surco y Semilla* (Furrow and Seed). About 5 percent of the sample population reported subscribing to or regularly buying the first publication, while only one persent of the respondents subscribed to the second. *El Campesino* contains a wider range of material of general interest, including short stories and advertising, than *Surco y Semilla*, which is oriented toward practical "do - it - yourself" matters.

Other publications with a particular agricultural perspective, such as technical bulletins and advertising material for specific products, reached fewer than 5 percent of the respondents. These subscribers generally had a relatively higher level of education and held larger units of land.

Perhaps the medium with the smallest distribution cost is the radio. Once a radio station is in operation its waves and messages can reach far regions and places as well as multiple audiences.

The country has improved rapidly in terms of the number of radio stations in service and the number of people who own radio receivers. In 1965, there were over 100 long-wave broadcasting stations in Chile, 25 of them operating in Santiago. Ownership of radio sets is common in most Chilean households. Over seven out of 10 farmers interviewed in the province of Colchagua reported having a radio set at home.

While radio is readily available to the population, other electronic media such as television and movies are limited mainly to urban populations or centers. Regular television programs are broadcast through two stations still in the experimental stages under the direction of the University of Chile and the Catholic University, both in Santiago. Commercial television in Chile has not yet been introduced, although there have been controversial discussions about making it a commercial enterprise. As of 1965, Santiago was the only city with television stations, and probably for many years the rural population, small towns, and even large cities in other provinces will not have access to this medium.

As far as availability of movies is concerned, Chilean rural communities are at a clear disadvantage. It is only in recent years that cinema has been used as an educational device. The three rural communities under study have only one movie theater,

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located in the urban center of San Fernando. The relative distance for most of the farmers and the lack of public transportation reduces the possibility for the average farmer to attend the cinema.

Patterns of Mass Media Use

The medium most commonly used by farmers is the radio. Seven out of ten respondents reported listening to at least one hour of radio programs daily. The typical amount of time devoted to radio programs by the sample population was 1.6 hours daily. This situation may be the result of two factors. One is the illiteracy rate of 12 percent of the respondents, to whom radio may constitute a medium of communication and entertainment. The other factor is that the survey was conducted during the winter season, a time when the average farmer remains indoors because of a scarcity of recreational activities.

A noteworthy fact was that radio seemed to be in maximum use; 71 percent of the sample population owned a radio set, and 70 percent listened to it at least one hour daily. All persons who reported being radio listeners had radio receivers in their homes. The problem of selective perception applied to the type of radio programs selected by the respondents may offer some insight into the potential use of this medium in agricultural education. While the large majority of the radio listeners openly preferred and selected news and general entertainment programs, only 5 percent indicated some interest in agricultural radio programs.

As far as the pattern of printed media use is concerned, readership appears to be highly concentrated in newspapers. A high proportion of the literate population (65 percent) reported reading one newspaper at least two days of the week. The reason for selecting two working days of the week regarding readership was to control occasional newspaper readers, especially those who might have read just one paper or those "holiday readers" who might read only the Sunday paper.

A similar criterion was used regarding magazines and books. The actual use made of magazines, taking into account all types available to the average Chilean farmer, declined considerably when compared with the use made of daily newspapers. Approximately one-fourth of the literate farmer population of the sample indicated reading at least one magazine of general interest during the week previous to the survey.

About 20 percent of the respondents reported reading books regularly. The lack of public libraries in the area was noticeable; even the city of San Fernando, the largest urban center of the province of Colchagua, did not have a general public library to provide service to its population.

Finally, it was found that over 60 percent of the farm operators did not have practical access to movies, and only 17 percent could be considered regular movie-goers. The only movie theater in operation was in the urban center of San Fernando which, for most of the farmers without private transportation, was difficult to reach, especially for evening showings.

Index of Exposure to Mass Media

For this analysis, an effort was made to systematize the various patterns of media use by the farmers by constructing an index of media exposure. This index was obtained by combining individual scores for all of the communication channels such as radio, daily newspapers, magazines, book readership, and movie attendance.

In computing the score for each farmer who reported to be regularly exposed to some of these media, an equal weight was assigned to each communication channel. Thus farmers who indicated that they received and read newspapers, magazines and books regularly, listened to radio programs and attended movies fre-

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quently received a five-point score. Those who reported they had not been exposed to any of these channels received a score of zero.

Although this index may be a crude measurement of general exposure to mass media, at least it provides a basis for systematizing degree of intensity of media use.

Only 9 percent of the sample population reported regular exposure to all five communication channels included in the index. At the other extreme, 17 percent of the farmers had not been exposed to any communication media. While 39 percent of the farmers had exposure to at least three communication channels, over six out of ten respondents reported use of two mass media or fewer.

Some Social Factors Related to Mass Media Exposure

Several studies have pointed out the relationship between media usage and such variables as age, sex, education, and socio-economic levels. In general, "media use increases with education and with economic status, and the amount of education correlates well with what a person chooses to read or listen to."[13] Also, the degree of exposure to various communication channels has been found to increase from childhood to middle age, with the exception of attendance at movies which seems to decrease at older ages. Campbell and Metzner[6] indicate that while radio listening is widespread in all educational groups, the book reading public generally constitutes a small minority which is highly correlated to education and income. As far as newspapers and magazines are concerned, no significant differences have been reported between men and women, although in terms of newspaper reading these authors found that men tend to read more than one newspaper with a marked preference toward reading editorial and financial pages.

To see to what extent these patterns of mass media use applied to the local situation and culture of Chilean farmers, various social characteristics of farm operators were correlated with exposure to mass media.

First, it was hypothesized that there would be a negative relationship between age and exposure to communication media. As indicated earlier, the median age for the sample population was 54 years. A relatively high proportion of the respondents (almost 15 percent) were older than 70 years of age. It was among these older farm operators that the highest rate of illiteracy was found and, consequently, their actual use of mass media is strongly limited to radio. Findings shown in table 3 support the hypothesis of a negative association between age and degree of exposure to mass media. They also indicate negative relationships between age and education, farm size and income. As could be expected, however, the respondent's age is well correlated with the number of years working in agriculture, the time spent operating his farm and the total number of years he has lived in the community.

Perhaps one of the most relevant factors regarding mass media use is the level of education held by a population. Many studies measure education in terms of actual years of schooling, on the assumption that formal education will provide the in-

Table 3. Zero-order correlations between exposure to mass media and selected independent variables

Variable	Mass media exposure
Age	−.15
Education	.60
Farm size	.30
Income from farming	.31
Total income	.40
Family size	.01
Years working in agriculture	−.10
Years working his own farm	−.10
Years living in the community	−.15

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dividual with at least three main benefits: knowledge, skills, and certificate of achievement that carries formal status.[28]

A typical finding in communication research supports the hypothesis that more educated persons tend to show higher exposure to various communication channels. The Chilean rural situation as reflected by the data shown in table 3 seems to fit this general pattern. Findings indicate a positive correlation ($r = .60$) between the level of education of Chilean farmers and their degree of exposure to communication media. Education also is postively associated with factors such as farm size ($r = .50$), income obtained from the farm and total income from all sources. On the other hand, educational attainment of farmers tends to be negatively associated with family size, number of years spent in farming, and the amount of time as residents in the community.

It also was hypothesized that farmers operating larger units would show a higher exposure to mass media than those holding small units of land. Although the correlation coefficient betwen size of operation and individual's score to the index of exposure to mass media is small ($r = .30$), it shows, at least, a positive association between the two variables. The same is true for the association between farm size and farmer income.

In general, income reported by respondents should be considered with some reservations. In most survey research, individuals interviewed are reluctant to give this type of information and the risk of getting omissions and misinformation seems to be larger in rural than in urban places.

An attempt to reduce this problem was made by asking each individual two different questions. One was aimed at estimating his relative income per year, taking the farm as the primary economic source. The other referred to the total income considering all possible sources. The fact that over nine out of ten respondents did not have other jobs outside their agricultural activities and a very low proportion of them rented other lands for regular operation indicates that the main source of income is the farm. The median income per year as reported by the respondents was about 2,000 escudos (U. S. $500.00 approximately), with little difference between farm income and total income.

This relatively low income for a large proportion of the sample population may be interpreted as a consequence of two principal factors: (1) the possibility of misinformation obtained from farms with large acreages who generally fear taxation; and (2) the fact that the largest majority of the farm operators are working at a subsistence level. Over seven out of ten individuals are operating small units of land with less than ten hectares (about 25 acres).

Considering these circumstances, a positive association between yearly income of farmers and their exposure to mass media was hypothesized. As shown in table 3, the data indicate a relatively small correlation coefficient between total income and mass media use ($r = .40$), which at least indicates a positive relationship of these two variables.

The hypothesis that there was a positive relationship betwen size of the farmer's family and degree of exposure to communication channels was not supported by the data. The assumption that in rural areas larger families may constitute a focus for more mass media use than those rural families with fewer members seems not to be a typical pattern among the Chilean farmers interviewed. The family structure in Chile, although tight, rather traditional, and extended in its form, especially in rural settings, may offer well-spread patterns of kinship relationship and an informal network of communication, but in terms of a potential "multiplier" of mass media use its functions are strongly limited. Among wealthy farmers with larger families,

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children are usually sent to large cities to receive their education. Among the large majority of subsistence farmers, children at an early age constitute manpower and because of obvious limitations of space and opportunity in their parents' units, they usually migrate in search of jobs without having, sometimes, any formal education.

The other three independent variables selected in relation to the degree of exposure to mass media refer to the number of years spent by farmers in agricultural activities, length of time they have operated their farms and the time they have resided in these communities. As shown in table 3, none of these three are associated with exposure to communication channels.

Out of all nine independent variables included in this analysis, educational levels, income and farm size seem to account for higher general mass media exposure. The younger farmer, relatively well educated, who operates a medium-sized to large unit which provides him with a higher economic income, seems to be the individual who makes wider use of mass media.

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DIFFUSION OF RECOMMENDED FARM PRACTICES AMONG CHILEAN FARMERS

The underlying assumption in the process of innovation is that rational decisions exist by which an individual is moved to adopt a new idea or technique. Various studies on the adoption of agricultural practices suggest that the final decision is usually rational in terms of taking into consideration alternatives and consequences related to the decision.[5]

Although this assumption about rational decisions does not reject the possibility that non-rational decisions exist, as Dichter points out referring to impulsive decisions of consumers in purchasing small and even large market items,[7,10] the more permanent nature of adoption of farm techniques would appear to indicate a set sequential process involving an adjustment of means toward achievement of ends. Moreover, as Linton says, "New farm and home practices like all innovations, are accepted primarily on the basis of their utility and their compatibility within the existing culture."[16]

It is generally agreed, however, that the adoption of a new farm practice or technique is essentially a decision-making process which occurs in specific stages through time.

With rather minor variations, sociologists concerned with diffusion of innovations have recognized five principal stages: awareness, interest, evaluation, trial, and adoption.[1,2] These stages, it is usually assumed, are not only rational, but also are developed in a certain sequence which appears to be empirically valid in most studies, although one study has shown the sequence to vary for certain practices.[3]

Practices Selected

Some studies of technological diffusion have suggested that success in getting farmers to innovate in agricultural practices is not only the result of the combined efforts of commercial and educational organizations serving as diffusion agents, but it also depends on the nature and characteristics of the new technique.[27]

One of the main characteristics considered by researchers is divisibility of the practice. This means that the potential accepter may try the new practice on a relatively small scale before adopting it. Thus, the farm operator may reduce chances of economic risk and also experience a stage of personal experimentation which has been found to be favorable for the final decision to adopt.

Taking into account this characteristic of divisibility of the technique, the following four recommended agricultural practices were selected for this study: nitrate, phosphate, herbicide, and certified seed.

The Adoption Model and the Chilean Setting

Judging from the general pattern of farmer response to questions about each stage of the adoption process, it may be suggested that this model is applicable for a large majority of the sample population.

It should be mentioned that this theoretical model is limited, when it is applied in a post facto situation

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where there is no experimental control over respondents passing through each of the stages of the process.

Considering this shortcoming of the model, Chilean farmers were able to identify stages of awareness, interest, trial, and adoption, but a large proportion of them did not follow the theoretical requirement of the model as far as the stage of evaluation is concerned. Although a large proportion of farmers evaluated the practices, there is evidence that many of them did so after trial or adoption. The continuity of the model in sequential stages then, was found to be only partially supported by the Chilean data. It was acceptable for the stages of awareness, interest, trial, and adoption but not for the stage of evaluation.

Table 4 shows the adoption stages as they relate to the four recommended practices. A first observation of these data reveals that a high majority of the farmers interviewed were aware of the existence of each of these practices. As was expected, nitrate was well known by almost every farmer (98 percent), a possible consequence of the length of time since this practice was introduced into farming activities and the agricultural market. Each of the other three practices was known by nearly three-fourths of the farmers or more.

One of the practical advantages of the identification of stages in the process of innovation is the possibility of detecting what might be called the "drop-out" of the adoption process. This refers to farmers who leave the process somewhere between the stages of awareness and final adoption.

If the total process is considered the over-all "drop-out" rate might be esimated by finding the difference in percentages between those farm operators who reported being aware of the existence of the practice and those who finally adopted it. In the case of nitrate, the "drop-out" was observed in over two-fifths of the respondents. While 98 percent of them said they were aware of nitrate, only 55 percent were adopters (see table 4).

The difference between the stages of awareness and adoption is highest regarding phosphate. Over three-fourths of the farmers indicated being aware of this practice, but only 28 percent of them reported adoption.

The lowest "drop-out" affects certified seed. About 39 percent of the farmers left the adoption process somewhere between the stages of awareness and adoption.

The data would allow comments on the following points:

First, the four practices selected for this study appeared to be fairly well known by most of the farmers interviewed.

Second, differences in awareness and interest among the four recommended practices could be interpreted in terms of the length of time they have been on the market in ad-

Table 4. Stages of adoption of four agricultural practices among Chilean Farmers (N = 244)

Practice	Adoption stage[a]									
	Awareness		Interest		Evaluation		Trial		Adoption	
	N	%	N	%	N	%	N	%	N	%
Nitrate	240	98	193	79	190	78	147	60	135	55
Phosphate ...	190	78	134	55	127	52	75	31	69	28
Certified seed .	182	75	149	61	147	60	99	41	88	36
Herbicide	178	73	139	57	133	55	86	35	76	31

[a] The nature of the adoption stages was found to be cumulative; that is, a farmer reporting adoption of a practice has also gone through the previous stages of the process.

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dition to the advantages of the product as perceived by the farmer. The difference between nitrate and phosphate in each of the stages is a case in point. To many farmers, especially those with low levels of education and small holdings, nitrate was the only fertilizer of which they were aware. Also, in the case of those who were aware of phosphate, they were not able to distinguish differences between this fertilizer and nitrate. Because nitrate had been largely diffused and was easier to obtain, they did not bother themselves with the new possibilities that phosphate might possess for them.

Third, differences among the practices as far as trial and adoption are concerned may be explained in terms of a combination of factors, such as length of time these practices have been available on the market, emphasis placed on their diffusion, effectiveness of diffusion, and mechanism and procedures used in introducing these practices among the farm operators.

As shown in table 4, nitrate occupies first place among the four practices adopted. Over one-half of the farmers have adopted it. Certified seed is second, having been adopted by 36 percent of the respondents. In third place is herbicide with 31 percent adopting; and phosphate is last with only 28 percent of the farmers indicating its adoption.

Sources of Information at the Different Stages

Various studies on diffusion of innovations have suggested that information sources and communication channels play different roles at the different stages of the adoption process.[1,37] An early study reported by Ryan in 1948 provided one of the first descriptions of these roles. He also indicated the possibility of making a functional classification of diffusion agencies as related to each stage of the adoption process.[27]

The critical importance of diffusion and communication as related to innovation was observed by Lionberger when he said that "farm and home practices improvement is affected by all the factors which condition the diffusion of culture traits."[18]

Several other researchers have pointed out the importance of specific communication channels or social groups as diffusion agents and influential sources in decisions relating to social action. Loomis, referring to rural social organizations, has indicated the relevant role played by social cliques and primary groups in the decision-making process of individuals.[20] A similar finding more related to the diffusion of farm information is reported by Lionberger in his study of a northeast Missouri farm community.[17]

In spite of the diversity of approaches, focuses of research and other factors, most of the studies tend to agree in two main findings: the possibility and necessity of a functional classification of sources of information, the fact that some sources appear to play a more important role at some stages of the adoption process than at other stages.

For the purposes of this study, the categorization of sources of information and influence was made by combining various similar communication channels into six general types: (1) *Informal associates* included friends, neighbors, family members, relatives, and others who may be closely related to the farmer. Usually they are in personal relationship and some sort of informal and face-to-face communication distinguishes their association. (2) *Mass Media* consisted of newspapers, radio, magazines of general interest, and motion pictures. (3) *Agricultural extension* which refers to the contacts of the farmers with agricultural agents, specialized bulletins, technical publications and other media sponsored by the agricultural extension service. (4) *Commercial sources* included banks or

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credit organizations and commercial public advertising by other means than general mass media. (5) *Institutional sources* included educational institutions of different levels, public and governmental organizations as well as private institutions with specific interest in farming. (6) *Self* which as a separated category included such answers as "what I have seen around," "because of my age," "my general experience," and others.

The general hypothesis to be tested here related to the different roles played by the various sources of communication at each stage of the adoption process as it was perceived by the farmers. Furthermore, some findings of previous research in the United States were tested in the light of the results obtained from Chilean respondents.

In the United States it is generally agreed that mass media sources are most important at the awareness stage; that is to say, when the individual farmer receives some general knowledge of the existence of the practice or technique.[1]

At this point, our hypothesis was that mass media in the Chilean setting appear to be divorced from this adoption process and that they play very insignificant roles as sources of information about farm practices. Two main factors related to this situation should be mentioned: one is the level of exposure of farmers to mass media, and the other is that the media contain only small amounts of agricultural information. As a consequence of this, in the place of mass media, one would expect to find various informal associates (family members, friends, neighbors, and others) who play the role of first source of information regarding farm practices.

A second hypothesis was that in Chile those sources including the agricultural extension service and other agricultural agencies play a relatively unimportant role, as perceived by farmers, through all stages of the adoption process. If this is true, it would indicate a quite different situation than in the United States. Research findings indicate that in the United States agricultural agencies are most important at the awareness stage, and retain a relatively influential role through the later stages. It was hypothesized that commercial and institutional sources of information are important not only at the trial stage, as suggested by studies conducted in the United States,[1] but that they also play a significant role at the stage of interest when the farmer searches for more information about the new practices.

The additional category of "self" was included among the various sources of information because of the possibility that it may play an important role at the later stages of the adoption process.

When the six types of sources of information are related to the stages of the adoption process for the four recommended agricultural practices, some variations are observed in the role that sources play at different stages of the process. Thus, the general hypothesis that certain sources of information are perceived to be more important than others at different stages of the adoption process is supported by the data shown in tables 5, 6, 7, and 8.

In spite of some variations from practice to practice, a general pattern is observable. First, informal associates are far more important than any other source of information at the stage of awareness. Second, commercial sources appear to play an important role at the stage of interest and later at the stage of trial. Adoption appears to be related to the previous stage of trial because the same source is indicated as most important. Thus, in the case of nitrate, informal associates are the most important sources of information at both the trial and adoption stages. In the cases of phosphate and certified seed, commercial sources appear to be playing an important role at the trial as well as at the adoption stage.

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Table 5. Sources of information at each stage in the adoption of nitrate

Most important source of information[a]	Adoption stage				
	Awareness	Interest	Evaluation	Trial	Adoption
	percent	percent	percent	percent	percent
Informal associates . .	62	39	31	29	27
Mass media	8	5	*	11	3
Agricultural extension .	3	10	8	11	14
Commercial	8	28	*	17	17
Institutional	18	12	5	11	20
Self[b]	..	..	50	16	16
No answer	1	6	6	5	3
	100	100	100	100	100
	(240)	(193)	(190)	(147)	(135)

[a] Refers to the "most important source of information" as perceived by the farmer.
[b] The category "self" includes those answers such as "what I have seen around," "my own work," "my age and general experience," and others.
* Less than .5 percent.

Table 6. Sources of information at each stage in the adoption of phosphate

Most important source of information[a]	Adoption stage				
	Awareness	Interest	Evaluation	Trial	Adoption
	percent	percent	percent	percent	percent
Informal associates . .	53	20	20	20	19
Mass media	13	5	1	9	1
Agricultural extension .	11	21	16	19	19
Commercial	15	27	5	29	28
Institutional	8	23	11	7	13
Self[b]	..	..	43	8	16
No answer	..	4	4	8	4
	100	100	100	100	100
	(190)	(134)	(127)	(75)	(69)

[a] Refers to the "most important source of information" as perceived by the farmer.
[b] The category "self" includes those answers such as "what I have seen around," "my own work," "my age and general experience," and others.

As expected, mass media did not mean much to farmers as sources of information of recommended farm practices. Only a low proportion of respondents recognized mass media as a source of information at the stage of awareness of the four practices selected. At the later stages of the adoption process, that proportion decreased and became insignificant.

Contrary to findings reported in the United States where the mass media are the most important sources of information at the awareness stage, in the Chilean situation mass media are not performing this function in terms of diffusion of farm practices. This might be related to two circumstances: first, in spite of the fact that most of the metropolitan mass media are available to farmers and the sample population presents a relatively high exposure to general mass media (newspapers,

Table 7. Sources of information at each stage in the adoption of certified seed

Most important source of information[a]	Adoption stage				
	Awareness	Interest	Evaluation	Trial	Adoption
	percent	percent	percent	percent	percent
Informal associates ...	43	25	20	21	14
Mass media	6	1	1	1	2
Agricultural extension .	12	20	9	11	15
Commercial	20	25	7	34	32
Institutional	18	25	5	27	24
Self[b]	..	..	51	2	9
No answer	1	4	7	4	4
	100	100	100	100	100
	(182)	(149)	(147)	(99)	(88)

[a] Refers to the "most important source of information" as perceived by the farmer.
[b] The category "self" includes those answers such as "what I have seen around," "my own work," "my age and general experience," and others.

Table 8. Sources of information at each stage in the adoption of herbicide

Most important source of information[a]	Adoption stage				
	Awareness	Interest	Evaluation	Trial	Adoption
	percent	percent	percent	percent	percent
Informal associates ...	60	37	21	24	20
Mass media	11	4	2	4	3
Agricultural extension .	11	19	9	19	14
Commercial	10	20	2	22	20
Institutional	6	17	2	8	18
Self[b]	..	..	53	21	21
No answer	2	3	11	2	4
	100	100	100	100	100
	(178)	(139)	(133)	(86)	(76)

[a] Refers to the "most important source of information" as perceived by the farmer.
[b] The category "self" includes those answers such as "what I have seen around," "my own work," "my age and general experience," and others.

magazines, and radio), media content is notoriously poor in terms of farming activities and technological innovations; the second factor might be the poorly developed community or local press, which could carry more specific information related to farming activities to a more specialized audience of farm operators.

Informal associates are not only important sources of information at the stage of awareness — a constant finding for all of the four recommended practices — but they also retain a relatively high influence through the other stages of the adoption process. Specifically in the cases of nitrate and herbicide, informal associates, such as family members, personal friends, close relatives, neighbors and other acquaintances, appear to play a more important role at each stage of the innovation process than other sources of information.

Regarding the agricultural extension service as a source of information, it was hypothesized that techni-

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cal agricultural agencies are relatively unimportant at the various stages of the adoption process among the Chilean farmers interviewed. Data for each recommended practice indicate ample support for the assumption. At the best, the agricultural extension service and other agricultural agencies are recognized in a third place among other sources of information at the various stages of the process.

Commercial sources appear to be important at the stage of interest and later at the stage of trial. Banks and credit organizations, especially in the cases of phosphate and certified seed, play a relatively important role in awakening interest among farmers and also in inducing them to try out these practices.

The high proportion of respondents who indicated the category of "self" as the most important for evaluation deserve special consideration. A large number of farmers had clearly evaluated the practices after they have tried or adopted them. In such cases, the theoretical model of sequential stages was not strictly measured.

TECHNICAL AGRICULTURAL COMMUNICATION AND THE DIFFUSION AND ADOPTION OF FARM PRACTICES

Division of labor and specialization of functions have created a large demand for specific information regarded as highly helpful in various human activities as well as in farming. Winfield, referring to specialized media, pointed out that from this perspective "communication means the movement of knowledge to people in such ways that they act on that knowledge to achieve some useful result."[38]

Leagens, in discussing the role of the communication process in rural development, remarks: "The extension educational process provides a foundation upon which extension educators can build effective plans for communicating useful information. Good subject matter and effective communication are the keys to successful extension teaching."[14]

Technical communication, then, appears to consist of a purposive communicator who, in attempting to transmit specialized knowledge to a particular kind of audience, will utilize specific channels. This might be the basic difference between this type of communication and the general mass media.

Availability and Use of Technical Media

As far as availability of technical information for farmers is concerned, Chile is at a very critical stage. Reference was made earlier to the scarcity of farm journals as well as adequate radio programs for farm audiences. Agricultural bulletins, whether they are edited and published by universities, government agencies, or commercial sources, usually have limited circulation, and they appear to be reaching only a very technically educated audience such as professional agronomists and a few farmers holding large areas of land.

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Technical mass media include radio programs on agriculture, farm journals, agricultural bulletins and contacts by individuals with the agricultural extension services operating in the area.

Patterns of technical media use vary significantly not only when they are compared with exposure to general mass media, but also in terms of differences found among the various channels. Thus it was found in this study that exposure decreases as the communication becomes more specialized (agricultural bulletins) or requires some sort of personal contact with the communication source (contact with the agricultural extension agent).

Seven out of ten respondents reported they were radio listeners. However, less than one-third of them could be considered regularly exposed to agricultural radio programs with some eventual technical message for their everyday activities. Also, slightly less than a third of the farm operators (31 percent) indicated they had read at least one of the farm journals during the month before the interview, while only 15 percent of the respondents reported to be regular readers of technical bulletins. This difference between farm journal readers and agricultural bulletin readers lies mainly in two factors. First, the technical bulletins use highly specialized language which obviously limits their circulation to farmers equipped to understand them. Second, there are few institutional sources performing functions of diffusion of this technical information or assisting the individual farmer in decoding and interpreting specialized information materials.

When those farmers who usually received agricultural publications (26 percent) were asked the type of institution from which they received this information, the majority (42 percent) indicated the "Sociedad Nacional de Agricultura" (The National Agricultural Society), an institution characterized by a selective membership of middle-large and large farm operators. Sources in second place were banks and other commercial organizations serving the area, while third in importance was the Ministry of Agriculture and its technical departments. One noteworthy finding was the fact that none of the respondents mentioned the universities as institutional sources from which they received technical information or publications.

Data show that an extremely low proportion of the farm operators interviewed were aware of the existence of the local agricultural extension service and less than one out of ten had received a visit from an extension agent.

By combining these four technical channels of communication and assigning an individual score to each farmer according to his actual exposure to one or more of these media, a crude index of technical exposure was obtained.

Only 3 percent of the sample population was exposed to all four technical channels, while over one-half of the respondents showed a zero score of exposure, indicating no use of these media. Likewise, while less than one-fourth of the respondents were exposed only to one of these technical channels, approximately one out of ten reported exposure to two, and six percent of them reported exposure to three of these media.

A comparison between this crude index of technical exposure and the index of exposure to general mass media reveals significant differences regarding the general distribution of exposure among farmers. For instance, general mass media usage appears to be relatively high for the farm population (only 17 percent indicated not being exposed to at least one communication channel), while a high majority of 56 percent use no technical media.

Despite this difference, both indexes appear to be associated and the ($r = .55$) correlation coefficient

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shows a positive relationship between exposure to general mass media and exposure to technical communication channels. This positive relationship may also be interpreted as an overlapping audience for both types of media.

The Process of Adoption and Farmer Exposure to Technical Communication

From previous discussion of the relatively unimportant part played by general mass media at each stage of the adoption process among Chilean farmers, a question arises with respect to technical agricultural communication.

To what extent may these specialized media be related to some of the stages of the adoption process when the degree of exposure is controlled? How different are behavioral patterns related to stages of awareness, trial, and adoption among farmers with high or low exposure to agricultural technical communication?

If significant differences are found between farmers with high exposure to this type of media and those with low exposure, such differences might indicate that technical agricultural media are effective in the adoption process and might point out wide possibilities for expanding these media in order to induce more farmers to adopt recommended practices.

For this analysis, the total population of the farmers was divided into two groups of high and low exposure to agricultural technical media. Scores of 0 and 1 on the index of technical media exposure were considered as low exposure to this type of communication ($n = 194$). Scores of 0 and 1 refer to individuals who are not exposed at all or have had contact with only one of those specialized communication channels, which in some cases may be accidental exposure to one communication medium.

Table 9. Stage of awareness, trial and adoption of four practices related to high and low exposure to agricultural technical media

Stage	Exposure to technical media: High ($N = 50$)	Exposure to technical media: Low ($N = 194$)			
	percent	percent			
Nitrate					
Awareness	100	98	(n.s.)		
Trial	94	58	$X^2 = 23.03$	$p < .001$	$Q = .84$
Adoption	94	51	$X^2 = 30.54$	$p < .001$	$Q = .88$
Phosphate					
Awareness	96	73	$X^2 = 12.00$	$p < .001$	$Q = .80$
Trial	72	24	$X^2 = 41.55$	$p < .001$	$Q = .78$
Adoption	64	19	$X^2 = 39.56$	$p < .001$	$Q = .77$
Certified seed					
Awareness	98	69	$X^2 = 18.18$	$p < .001$	$Q = .91$
Trial	84	31	$X^2 = 46.03$	$p < .001$	$Q = .84$
Adoption	78	26	$X^2 = 45.66$	$p < .001$	$Q = .80$
Herbicide					
Awareness	94	68	$X^2 = 14.12$	$p < .001$	$Q = .77$
Trial	78	27	$X^2 = 43.47$	$p < .001$	$Q = .81$
Adoption	68	24	$X^2 = 34.35$	$p < .001$	$Q = .74$

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The group of farmers with high exposure to technical media ($n = 50$) consisted of those respondents who had regular contacts with two, three, or all of these specialized media channels.

Data shown in table 9 indicate significant differences between farmers with high and low exposure to technical media as related to the three stages of awareness, trial, and adoption.

Only in the case of nitrate are the differences between farmers with high and low technical media exposure not significant at the stage of awareness. This situation, as pointed out previously, may be the result of the length of time that this practice has been available in Chilean agriculture. However, at the following stages of trial and adoption, differences are significant ($p < .001$) and the relationship between high exposure and trial and adoption of the practice appears to be high. (At the stage of trial, the coefficient of association was Yule's $Q = .84$; $Q = .88$ at the adoption stage.)

As far as phosphate is concerned, differences at each stage of the process are consistently significant at the $p < .001$ level between the two categories of farmers with high and low exposure to technical media.

At the stage of awareness of phosphate, the association between high exposure and knowledge about this practice is strong ($Q = .80$); this relationship also is found at the stages of trial ($Q = .78$) and adoption ($Q = .77$).

A similar pattern of differences between the two groups of farmers and close association between high exposure and stages of the adoption process can be reported for certified seed and herbicide. For both practices at each stage, differences between the two groups of exposure are significant at the .001 level. In the same manner, measurements of association show the intensity of the relationship between high exposure to technical media and farmer participation at the stages of awareness, trial, and adoption.

Formal and Informal Sources of First Information Related to Degree of Exposure to Technical Media

The consistency of informal associates as the most important source of information at the awareness stage of the four selected practices indicated earlier provokes the question whether or not such a pattern might offer some variation regarding degree of exposure to specialized agricultural communication.

A new dimension in categorizing sources of information can be formulated in terms of formal and informal sources. Formal sources of information include those communication channels such as banks and credit organizations, educational institutions at various levels, government and private organizations, general mass media and other services. These usually do not involve direct, face-to-face contact with farmers, and when they do so, the type of relationship is characterized by a relatively high structuralization and formality. Informal sources, on the other hand, consist of close and intimate associates of the farmer. Family members, relatives, friends, neighbors, landlords, and acquaintances in everyday activities are some examples. Among the main characteristics of the relationship between the farmer and these associates are geographical and social proximity, intimacy, and lack of formality.

It is hypothesized that farmers who present a high level of exposure to technical media will recognize formal channels of communication as sources of first information of recommended practices to a greater extent than those individuals with low exposure to specialized media.

The emphasis here is placed on the stage of awareness mainly because of the prominent role played by informal associates at this first step of the adoption process.

Table 10. Relationship between exposure to technical media and types of formal and informal sources of information at the awareness stage

Information source	Exposure to technical media: High	Low			
Nitrate	N = 47	N = 190			
	Percent				
Formal	51	34	$X^2 = 4.88$	$p < .05$	$Q = .35$
Informal	49	66			
	100	100			
Phosphate	N = 48	N = 142			
	Percent				
Formal	60	42	$X^2 = 5.14$	$p < .05$	$Q = .37$
Informal	40	58			
	100	100			
Certified seed	N = 49	N = 133			
	Percent				
Formal	65	51	$X^2 = 2.90$	$p < .10$	$Q = .29$
Informal	35	49			
	100	100			
Herbicide	N = 45	N = 129			
	Percent				
Formal	51	32	$X^2 = 5.36$	$p < .05$	$Q = .38$
Informal	49	68			
	100	100			

Findings are shown in table 10. They indicate, first, a differential pattern between farmers with high and low technical exposure regarding formal and informal sources of first information. For three of the agricultural practices (nitrate, phosphate, and herbicide), a significant difference at the $p < .05$ level was found. The only exception is certified seed ($p < .10$).

For each practice, over one-half of the farmers with high exposure reported using formal sources at the stage of awareness. This proportion increased to 65 percent of the respondents with high technical exposure at the awareness stage for certified seed.

From this information, it is possible to deduce that among those farmers with low exposure to technical media the kinship system still dominates, and informal channels of communication still operate to carry information regarding new farming practices.

Place of First Information

In the diffusion of new ideas, practices and techniques, the ecological factor usually determines availability and effectiveness of communication. Distance of a farm community from large population centers may create difficulties in transportation and

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communication as well as affect the social organization of its members. On the other hand, as far as ecological patterns are concerned within a farmer's community, physical distance between households may constitute a natural barrier for social interaction and, consequently, for the diffusion of agricultural practices.

Previous studies have shown that farm people rely heavily on the ecological configuration in the diffusion of farm information.[19] Findings have suggested that "this reliance of neighborhood residents on intimate associates, to the relative exclusion of institutionalized sources and mass communication media, seems to indicate a localistic-traditional type of orientation with respect to the seeking of farm information."[19]

In relation to this, two questions deserve attention. One is concerned with the place of first information which will allow us to explore the extent that "localistic-traditional type of orientation with respect to the seeking of farm information" is also present among Chilean farmers. Our hypothesis here was that a large majority of Chilean farm operators would recognize their own local community as the place of first information about farm practices.

The second question inquires about possible differences between farmers with high and low exposure to technical media in relation to urban and rural settings for first information. It might be hypothesized that those individuals with high technical media exposure are significantly different from those with low exposure as far as the nature of the place where the diffusion process begins is concerned. Farmers with high exposure to technical media, as shown earlier, appear to be using more formal sources of information at the stage of awareness. This fact may indicate that the place where these formal sources operate, which is usually in an urban center, might be also related to this group of farmers with high technical exposure.

Three general places were identified as sources where the farmer first learned about these practices. One corresponded to the same community where the individual lived and worked. The geographical limits of the three "comunas" of San Fernando, Placilla, and Chimbarongo are usually accepted as the social boundaries of each community. The second category refers to "other rural areas" where the farm operator has lived, worked or visited. Finally, a category distinguishing urban places in general was included.

The consistency of the pattern that individualizes the local community as the setting where the diffusion of the four practices started can be noted. At least seven out of ten farmers got to know about the practices within the limits of their own community.

The relative exclusion of urban centers as places of first information is reflected by the low proportion of farmers who reported to have been informed about the practices in urban places. Only 15 percent indicated an urban center as place of first information regarding nitrate, phosphate, and herbicide. This proportion increases to one-fifth of the respondents with regard to certified seed, which appears to be the practice highly diffused by institutional and commercial sources.

These findings support the hypothesis that the majority of Chilean farm operators included in the sample recognize their own community as the place of first information. The farmers also seem to indicate a localistic-traditional type of orientation with respect to the seeking of farm information.[19]

What are some of the factors that might be related to this situation? In general, it could be anticipated that the local community is an important factor in the diffusion of farm information. It is within the community where farmers develop some sort of extended kinship which includes family members, relatives, friends, and

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neighbors. Over 40 percent of the respondents reported to have brothers and sisters working in agriculture and almost 80 percent of them indicated that these family members were living in the same community. Furthermore, one-half of those brothers and sisters of the respondents who lived outside the boundaries of the community lived closer than 60 miles from the interviewed household. This physical proximity contributes to social contacts among family members who, in terms of diffusion of farm information, appear to play a significant role as sources of information and influence through stages of the adoption process.

In addition, the community as a distinctive ecological unit provides opportunity to incorporate into this kinship system of social relations neighbors, friends, work associates and other elements of the community who operate as informal sources of information in the process of diffusion of innovation.

A second question appears to be relevant regarding place of first information related to degree of exposure to specialized agricultural media. In table 11, significant differences between those farmers with high and low exposure to technical media are shown in relation to urban and rural places of first information. Data clearly support the hypothesis that such a difference between the two groups of farmers exists, and the data also suggest a positive association between high exposure to technical communication and urban centers.

Table 11. Relationship between degrees of exposure to technical media and place of first information of four recommended agricultural practices among Chilean farmers

Place of first information	Degree of exposure: High	Degree of exposure: Low			
Nitrate	N = 49	N = 189			
	Percent				
Urban	39	10	$X^2 = 21.88$	$p < .001$	$Q = .60$
Rural	61	90			
	100	100			
Phosphate	N = 46	N = 139			
	Percent				
Urban	28	11	$X^2 = 8.21$	$p < .01$	$Q = .53$
Rural	72	89			
	100	100			
Certified seed	N = 49	N = 131			
	Percent				
Urban	37	15	$X^2 = 10.79$	$p < .01$	$Q = .55$
Rural	63	85			
	100	100			
Herbicide	N = 45	N = 128			
	Percent				
Urban	24	12	$X^2 = 4.22$	$p < .05$	$Q = .42$
Rural	76	88			
	100	100			

For each agricultural practice, differences between farmers with high and low exposure are significant using the Chi-square technique. (For nitrate, the difference is significant at the level of $p < .001$; in the case of phosphate and certified seed, differences are significant at a level of $p < .01$; for herbicide, the level of significant differences was found to be $p < .05$.)

In spite of the fact that in each group with either high or low exposure, the highest proportion of farmers identify a rural area as place of first information, the general trend suggests a positive association between high exposure to technical media and awareness of the practices in urban places.

These findings seem to indicate that, despite the fact that an overall majority of farmer respondents recognize the local community and other rural areas as places of first information, the farmers with low exposure are those who depend and rely heavily on localistic-traditional types of diffusion methods. On the other hand, it might be suggested that those who are highly exposed to specialized agricultural media may have a higher motivation to seek farm information beyond the boundaries of their informal associates and outside the limits of their local community or connected rural areas. Formal sources of information, as mentioned earlier, include various institutionalized sources, commercial and credit organizations, educational and governmental agencies, which by the nature of their objectives operate in urban centers. Findings appear to support the idea that a minority of the sample population, at least those with high exposure to technical media, go to where these institutions are instead of a reverse direction which might provide them with farm information right on their own farm. Diffusion of innovations in this way might be more rapid, less costly to the farmers and perhaps more efficient in terms of final adoption.

Present Interest and Attitudes toward Agricultural Practices

Even after the adoption process is completed with the final acceptance or rejection of some recommended agricultural practice, farmers will continue to show various degrees of interest and different attitudes regarding the new items. In general, those individuals who have adopted a farm practice and also have experienced some of the potential benefits derived from the regular application of an item probably will be the farmers who will show a higher interest and more favorable attitudes toward that practice and toward a wider range of innovations.

Interest in something does not necessarily mean an actual commitment which will foster an action. However, an attitude, whether it is positive or negative, is usually regarded as a step closer to an action. Although interest and attitude may be motivational stages, the latter usually reflects the direction that an individual will pursue after his decision is made.

The continuation of diffusion, the establishment of a permanent flow of technical information and a regular and more direct advice service may contribute to developing interest and to increasing favorable attitudes of farmers toward recommended practices.

To what extent does exposure to specialized agricultural media contribute to maintainig a high level of interest and favorable attitudes of farmers toward innovations? This question suggests the following hypotheses:

First, there is a significant difference between farmers with a high level of exposure to technical media and those farmers who have low or no exposure to such specialized media. Secondly, there would be a positive association between level of exposure to technical media and manifested interest in recommended practices. Thus, farmers with a high level of exposure will also have a higher

interest in selected practices. Similar hypotheses can be formulated regarding favorable and unfavorable attitudes toward nitrate, phosphate, certified seed, and herbicide.

Findings with respect to present farmer interest in the practices are reported in table 12. A consistent pattern of differences is shown between those farmers with high and low levels of exposure when a dichotomy is made in terms of manifest interest and lack of interest for each separated practice. In spite of the fact that differences regarding present interest for certified seed and herbicide are significant only at a level of $p < .10$, in the case of nitrate such a level was found to be $p < .05$ and with respect to phosphate, $p < .01$. Consequently, data appear to support the hypothesis which states that there are differences between farmers who show a high exposure to technical media and those who have some occasional exposure or no exposure to this kind of specialized communication.

With regard to the second hypothesis, the association between level of exposure to technical media and degree of interest in agricultural practices was found to be positive, although rather weak in intensity. Variations from practice to practice should be noticed as well as the fact that a large majority of farmers with low exposure to technical media also reported that they were currently interested in each selected practice.

The wide range of farmer attitudes toward the four recommended practices was dichotomized in terms of favorable and unfavorable attitudinal positions. For many of the farmers who had not yet adopted some of the

Table 12. Present interest in selected agricultural practices related to level of exposure to technical media among Chilean farmers

Interest in practice	Degree of exposure				
	High	Low			
Nitrate	N = 50	N = 167			
	Percent				
Interested	94	79	$X^2 = 5.97$	$p < .05$	$Q = .61$
Not interested	6	21			
	100	100			
Phosphate	N = 48	N = 139			
	Percent				
Interested	90	71	$X^2 = 7.00$	$p < .01$	$Q = .57$
Not interested	10	29			
	100	100			
Certified seed	N = 49	N = 129			
	Percent				
Interested	94	83	$X^2 = 3.52$	$p < .10$	$Q = .52$
Not interested	6	17			
	100	100			
Herbicide	N = 47	N = 129			
	Percent				
Interested	91	79	$X^2 = 3.66$	$p < .10$	$Q = .48$
Not interested	9	21			
	100	100			

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recommended practices, a favorable attitude toward them may indicate a positive evaluation with respect to potential benefits perceived in the practices and a first step to try out and finally adopt the new item. Similarily, for those who already had applied the practice regularly, a favorable attitude may indicate satisfaction with their results and also reinforcement in their decision to continue its use.

On the contrary, an unfavorable attitude to the practices could be an indicator of misinformation regarding the qualities of these new items, ignorance regarding its properties, or rejection of them because of the farmer's present situation.

Table 13 shows that the data support the hypothesized difference between farmers with high and low exposure to technical media with regard to favorable and unfavorable attitudes toward the four selected practices. Significant differences measured by the Chi-square technique are reported in each practice.

In terms of the hypothesized relationship between favorable attitude toward practices and a high level of exposure to specialized media, a pattern of positive association was found. The coefficient of association Yule's Q indicates that although the intensity of the relationship between the two variables is weak, the direction of the association is positive between level of exposure to technical media and favorable attitudes toward recommended practices.

Table 13. Relationship between levels of exposure to technical agricultural media and attitudes of Chilean farmers toward recommended farm practices

Attitude	Degree of exposure				
	High	Low			
	N = 50	N = 184			
Nitrate	Percent				
Favorable	96	71	$X^2 = 4.73$	$p < .05$	$Q = .64$
Unfavorable	4	29			
	100	100			
	N = 48	N = 133			
Phosphate	Percent				
Favorable	90	76	$X^2 = 7.17$	$p < .01$	$Q = .65$
Unfavorable	10	24			
	100	100			
	N = 49	N = 127			
Certified seed	Percent				
Favorable	96	89	$X^2 = 2.06$	$p < .10$	$Q = .49$
Unfavorable	4	11			
	100	100			
	N = 47	N = 126			
Herbicide	Percent				
Favorable	98	86	$X^2 = 5.18$	$p < .05$	$Q = .77$
Unfavorable	2	14			
	100	100			

SOME FACTORS RELATED TO ADOPTION OF FARM PRACTICES

The actual adoption of nitrate, phosphate, certified seed, and herbicide was affected by the "drop-out" phenomena. Thus, while almost the total population of the sample (98 percent) was aware of the existence of nitrate and a large majority had shown interest and even tried out the practice, only 55 percent of the farmers adopted it. Evidence indicates that the actual rate of adoption for the other three practices was quite low among the Chilean farmers interviewed. Only 36 percent of the farmers adopted certified seed, and this proportion decreased to 31 percent and 28 percent regarding herbicide and phosphate, respectively.

If the acceptance and adoption of new agricultural practices may be included in the wider area of technological change, as various works of anthropologists and sociologists suggest,[21,36] the dynamics of change experienced by Chilean farmers appear to be slow and of limited scope.

An Index of Adoption

The dependent variable used in this analysis was an index of adoption which combined the farmer's applications of the four selected practices for at least two consecutive years. Each respondent was assigned a score in terms of the number of practices adopted by him. Thus, a score of four indicated the use of all four practices, while a score of zero indicated that the farmer had not adopted any of the new items.

In addition to the requirements for selecting the four practices in terms of their applicability in the area, their test and improvement by agricultural experimental stations, and their recommendation by technically competent agronomists, the possibility of obtaining a unidimensional scale also was considered in choosing the four practices.

The assumption was that nitrate would constitute the highest adopted item, followed by certified seed and herbicide. Phosphate, another type of fertilizer with smaller diffusion and availability than nitrate, would constitute the least adopted item of the scale.

By applying the Cornell technique or Guttman scale, [11] it was found that over 85 percent of the respondents followed the pattern required by the distribution of the scale items. The coefficient of reproducibility was found to be .96, which indicates the percent of accuracy with which responses can be reproduced from the total scores.

The farmers' responses to the index of adoption show that only one-fifth of the farmers adopted all four practices, while 36 percent were non-adopters. Similarly, while 22 percent of the farmers adopted only one practice, only 12 percent adopted two items and 9 percent adopted three items.

The wide range of factors that may account for the variation of the adoption of farm practices suggests that they be grouped according to two main categories: (1) Personal and social characteristics of adopters, such as age, education, farm size, and social status; and (2) sources of

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information which appear to be more influential in the decision-making process of individuals and the relationship between the adoption index and levels of exposure to mass media and technical agricultural communication.

Personal and Social Characteristics of Adopters

Some of the major differences between farmers who adopted at least one of the recommended farm practices and the non-adopters are shown in table 14. The relative difference between the ages of these two groups is noticeable. While the median age for adopters is 52 years, the median age of non-adopters is 57 years. This finding supports our hypothesis of a negative association between adoption and age of farmers. The product-moment correlation coefficient between these two variables ($r = -.11$) tends to confirm this hypothesis. It also suggests that older farmers may tend to resist innovation and general technical change in agriculture.

There is also a significant difference between adopters and non-adopters in terms of years of formal education. The median number of years of school attendance indicates that farmers who adopted agricultural practices have completed their elementary education, and one-half of them received some years of high school, technical, or vocational education. Among this group of adopters, a few had higher education in universities. On the contrary, the median number of years of school attendance for non-adopters is only 2.5.

The time spent in agricultural activities appears to be similar for both groups, being slightly shorter for adopters who are also younger than non-adopters. Thus, the hypothesis suggesting a negative association between the time spent in agriculture and adoption of farm practices is not supported by the data.

Table 14 shows that over nine out of ten of the non-adopters operate small farms not larger than ten hectares (about 25 acres or less), while none of them own a large farm (over 100 hectares). Among the adopters, it was found that, in spite of the fact that three-fifths of them own small units, the larger the farm, the higher the adoption of recommended farm practices. This finding supports our hypothesis of a positive association between these two variables ($r = .37$).

The difference in social status between adopters and non-adopters is also supported by the data ($p < .001$). Among the category of adop-

Table 14. Differential characteristics of adopters and non-adopters of recommended agricultural practices (N = 244)

Characteristic	Adopters N = 157	Non-adopters N = 87
Median age of farmers	52	57
Formal education (median number of years of school attendance)*	6.3	2.5
Time in agricultural activities (median number of years)	28.3	29.2
Farm size: (a) large (percent)	15	...
(b) middle (percent)	25	7
(c) small (percent)**	60	93
Social status: (a) high (percent)	11	...
(b) middle (percent)	66	49
(c) low (percent)**	23	51
Participation in social organizations (percent)**	30	3

* Significant at the 1-percent level.
** Significant at the .001 level.

ters, a small proportion of farmers (11 percent) holds a high status, while two-thirds of them are in the middle-class category. On the other hand, none of the non-adopters have high social status and one-half of them hold low status. These differences seem to support the hypothesis that the higher the social status of the farmer, the higher his adoption of farm practices.

The level of social participation was quite low among the farmers interviewed. Only 20 percent of the sample population reported membership in some kind of formal social organization. Only 15 percent of them regularly attended various meetings of these organizations, and less than one out of ten farmers indicated having had some sort of leadership within their formal group.

This situation becomes critical when comparing membership in social organizations between adopters and non-adopters. While 30 percent of the adopters belonged to some formal organization, only three percent of the non-adopters reported some minimum of social participation. This finding shows that, in spite of deficiency in the organizational structure of Chilean rural communities which limits membership and participation in collective, organized, common interest groups for most farmers, there seems to be a positive association between adoption of farm practices and participation in formal social organizations.

Modernization in agriculture demands higher investment from farmers who want to keep pace with technological development. Increased productivity, reduced production costs and other improvements in farming certainly require a permanent flow of investment.

At this point, Chilean agriculture presents one of its most critical barriers to progress. As indicated by Deyoe,[9] Chilean farmers invest only 12 percent of their total income per year to improve their operations. (A general estimate for farmers in Minnesota suggests an average investment of 20 percent or more).

Among the farmers of the sample population, only 25 percent reported that they had made some investment during the previous agricultural year. When they were asked about their intended investment for the following year, this proportion decreased to 16 percent. It was estimated that the median investment allocated by respondents to farm improvements was about 5,000 escudos (slightly over $1,000). Only a small proportion of the sample (5 percent) with large farms reported to have made investments over 20,000 escudos.

This group of Chilean farmers who reported investment in their operations is the same group which holds large units of land, shows higher levels of education and exposure to mass media and technical agricultural communication, and reflects higher scores in the index of adoption of farm practices. This confirms the hypothesis that there is a positive relationship between farm investment and adoption of innovation.

Sources of Information at the Adoption Stage

It was pointed out previously that various sources of information are recognized by farm operators at different stages of the adoption process. Likewise, the data revealed that it is possible to categorize these communication channels in terms of their relative importance to farmers as they pass through steps of awareness, interest, evaluation, trial, and adoption of farm practices.

It should be noted that this information concerns only farmers included as adopters; their answers identify the most influential source of information at the moment they made their decision to adopt the practices.

Findings reported in Table 15 show two major variations in farmer behavior as it relates to sources of influence. One is that for each prac-

Table 15. Sources of information influencing adoption of four recommended farm practices among Chilean adopter farmers

Source of information	Nitrate	Phosphate	Certified seed	Herbicide
	percent	percent	percent	percent
Informal sources	31	22	14	22
Mass media	4	1	2	4
Agricultural extension	14	19	16	15
Commercial sources	18	28	32	19
Institutional sources	18	14	24	16
Self-evaluation	15	16	12	24
	100	100	100	100
Number of cases	145	74	91	88

tice there is a wide variation in the recognized importance of these various communication channels. The other refers to proportional variations of recognized importance of channels from one practice to another.

With reference to the first point, while 31 percent of adopter farmers mentioned direct influence from informal associates in their decision to adopt nitrate, only 4 percent mentioned mass media. This proportion increases to 14 percent of adopters identifying agricultural extension agencies, and it increases to 36 percent if commercial and institutional sources are combined. Similar variations are reported for the other three practices.

In spite of these variations, a general pattern can be described as follows: first, the group of informal associates appears to be recognized by a relatively large proportion of respondents as an influential source at the adoption stage.

Second, mass media effects have been practically irrelevant in influencing farmers to adopt these practices.

Third, agricultural extension services as such, including personal visits of aronomists to farmers, diffusion to technical agricultural information and other sponsored programs by the Ministry of Agriculture and its technical departments, ranked relatively low in recognized importance as an influencial source at the adoption stage.

Fourth, commercial and institutional sources when combined constituted the most influential formal source for adoption of the practices. In the case of certified seed, over one-half of the adopter farmers reported being convinced by commercial and institutional services to apply this item on their farms.

Finally, the additional category of "self-evaluation" should be included here as a type of influential source because a relatively high proportion of respondents indicated that they followed their own judgment in adopting these practices. Almost one-fourth of the adopters recognized their "self-experience" in farming activities and "self-evaluation" of the results after trial as determining their decision of adopting herbicide.

Another perspective with regard to influential sources of communication reveals that although a high proportion of adopter farmers relied heavily on informal associates as communication sources at early stages of the process, they changed channel preferences at the final point of adoption. If all sources of information are classified in terms of informal and formal channels, holding constant the category of "self," at the adoption stage a higher proportion of

those farmers who actually adopted the practices recognized that they had been influenced by formal sources. Among these sources, commercial and institutional agencies shared first place while agricultural extension services appeared third.

Although the role of mass media at each stage of the adoption process is rather insignificant, exposure to public information channels should not be excluded as a possible source for adopters. Thus, it was hypothesized earlier that the higher the farmer's position in the index of exposure to communication media, the higher the level of adoption of farm practices. The correlation coefficient between these two variables was found to be relatively small ($r = .55$), but it shows a positive association between exposure to sources of public information and the level of technological improvement achieved by farm operators.

A similar finding should be reported regarding the correlation between exposure to agricultural technical information and the farmer's score in the index of adoption ($r = .56$).

These findings permit the conclusion that those farmers who make more use of various communication channels available to them, whether they are general mass media or specialized technical communication channels, will also tend to be more receptive to new ideas, more inclined to adopt new farm practices, and more flexible toward technological change.

SUMMARY

This study presents some of the problems of the organizational structure of Chilean agriculture and explores some of the factors related to diffusion and adoption of agricultural practices as part of the processes of social and technological change and development.

Three main inter-related factors underline the problem of Chilean agriculture: (1) misuse of the land, (2) the land tenure system, and (3) the critical lag in agricultural production.

The research problem was articulated in terms of two central factors considered to be accelerators of agricultural development: (1) the analysis of the processes of communication and diffusion of new ideas and technologies, and (2) the acceptance and actual adoption of recommended farm practices among Chilean farmers.

The theoretical framework utilized was the rational model of innovation, structured by five major stages which have been recognized in the following sequence: (1) *Awareness*, (2) *Interest*, (3) *Evaluation*, (4) *Trial*, and (5) *Adoption*. This model was supported by the data with the exception of the evaluation stage.

Three dependent variables were selected: (1) Exposure to mass media defined in terms of farmer use of available public information channels; (2) exposure to technical agricultural communication defined by the use of specialized media such as agricultural radio programs, farm journals, technical bulletins, and farmer contact with the Chilean agricultural extension service; and (3) adoption of recommended farm practices. The practices selected were nitrate, phosphate, certified seed, and herbicide.

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A stratified sample without replacement of 244 farmers of three communities located in the province of Colchagua in the central valley of Chile was drawn.

Levels of usage of public information channels, measured by an index of exposure to mass media, were found to be associated with social factors such as age, education, farm size, and income. Younger farmers, with more education, operating middle-size or larger farms, enjoying higher income, were the individuals who used mass media and technical media more extensively.

Also, exposure to agricultural technical information was found to be closely related to diffusion and adoption of farm practices.

Age, education, social status, farm size, and social participation were positively related to adoption of new techniques. Significant differences were found between "adopter" and "non-adopter" farmers in terms of these personal and social characteristics.

Information sources were combined into six categories and their importance to the adoption process was examined. It was found that: (1) Certain sources of information were more important than others at different stages of the adoption process; (2) informal associates, including farmer's relatives, friends, and neighbors constituted a powerful diffusion agent and were influential sources for innovation; (3) commercial and institutional sources were perceived as helpful in interesting farmers to look for more information about the practices, in moving them to try out the practices, and influencing them to adopt; (4) mass media appeared to be virtually divorced from the adoption process; and (5) the agricultural extension service and other agricultural agencies were found to play relatively unimportant roles as diffusion and adoption agents.

The fact that these services are limited to a very low proportion of farmers, mainly oriented to large landholders with higher levels of education, suggested the need of an urgent expansion of technical assistance and agricultural advice as one manner of introducing change in traditional farming methods and increasing agricultural production.

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